THE VARIETIES OF *LIATRIS ELEGANS* (ASTERACEAE)

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ABSTRACT

A description of two new infraspecific taxa in *Liatris elegans* is presented. ***Liatris elegans*** var. ***bridgesii***, var. nov., occurs on the Carrizo and adjacent Eocene sand formations in central Texas. ***Liatris elegans*** var. ***kralii***, var. nov., occurs on the Fall Line Sandhills and coastal plain of Alabama and Georgia to the northern panhandle of Florida. The newly described taxa are similar to each other in their cream-white to yellow (vs. anthocyanin-colored) phyllary apices but they are widely separated geographically and each is distinct in other morphological features; they are viewed here as having independent origins. *Liatris elegans* var. *flabellata* is reduced to a form of *L. elegans* var. *elegans*, while *Liatris elegans* var. *carrizana* is maintained for southern-central Texas populations. *Liatris elegans* var. *elegans* is widespread on the coastal plain from South Carolina to eastern Texas.

KEY WORDS: Liatris, Asteraceae, Texas

RESUMEN

Se presenta la descripción de dos nuevos taxa infraspecíficos en *Liatris elegans*. ***Liatris elegans*** var. ***bridgesii***, var. nov., se da en el Carrizo y formaciones arenosas adyacentes del Eoceno en el centro de Texas. ***Liatris elegans*** var. ***kralii***, var. nov., aparece en la Fall Line Sandhills y llanura costera de Alabama y Georgia hasta el estrecho de Florida. Los nuevos taxa descritos se parecen entre si por sus ápices de los filarios de blanco-crema a amarillo (vs. color de antociano) pero están ampliamente separados geográficamente y se diferencian por otras características morfológicas; Se ven aquí con dos orígenes independientes. *Liatris elegans* var. *flabellata* se ha reducido a una forma de *L. elegans* var. *elegans*, mientras que *Liatris elegans* var. *carrizana* se mantiene para las poblaciones del sur-centro de Texas. *Liatris elegans* var. *elegans* es común en la llanura costera desde Carolina del Sur al este de Texas.

Liatris elegans Michx. is an obligate psammophile, occurring in well-drained, loose to somewhat compacted sandy soils in open to sparsely forested habitats across much of the Gulf and Atlantic coastal plains and in the southern Interior Highlands province in Arkansas. Its colored, elongated, conspicuous phyllary apices in combination with white to yellowish-cream corollas distinguish it as one of the most recognizable species in the genus (cf. King & Robinson 1987). All other species have more or less herbaceous, relatively short, inconspicuous phyllaries with exserted, lavender to pink corollas (Gaiser 1946). Thus, in *L. elegans* the phyllaries rather than the flowers provide primary visible coloration of the columnar inflorescences. Throughout most of the range of *L. elegans* (herein, *L. elegans* var. *elegans* and *L. elegans* var. *carrizana* L.O. Gaiser) populations have phyllaries that are predominantly shades of lavender, pink, bluish, or magenta, colors that are presumably generated by anthocyanin

pigments. Two sets of populations, one on the western margin of the range in Texas, another in the eastern Gulf Coastal Plain in Alabama, Georgia, and Florida, mostly lack classic anthocyanin coloration at anthesis. Instead, these have primarily yellowish, cream, or nearly white phyllaries with some populations variably cream to faintly lavender. The Texas populations were discussed briefly by Gaiser (1946, p. 174, as *L. elegans* forma *fisheri* Steyermark), but accurate description of the variation is lacking. In addition, the well-defined pattern of distribution of the eastern coastal plain pale-phyllaried populations has never been addressed. While phyllary color alone may not be taken as a reliable indicator of genetic cohesion, the geographic integrity and populational uniformity of these unique populations suggests that selection for phyllary color has taken place within these populations. A recognizable suite of other morphological features supports their recognition but the presence of intergradation of both sets of populations with var. *elegans* further suggests that recognition at an infraspecific rather than specific rank is warranted. I have chosen variety to indicate that intermediate populations occur along the margins of these novel taxa.

Liatris elegans Michx. var. **bridgesii** Mayfield, var. nov. (**Fig. 1**). TYPE: U.S.A. TEXAS. MILAM CO.: 2.6 mi W of [FM 487 in] Rockdale on US 79; S side of railroad track, Simsboro Sand Formation, 505 ft, N 30°38'34" W 97°02'52", 6 Sep 1992, *Mark H. Mayfield 1549* (HOLOTYPE: TEX; ISOTYPES: F, FLAS, GA, GH, MO, NCU, NY, US).

Liatris elegans forma *fisheri* Steyermark, Field Mus. Nat. Hist., Bot. Ser. 11: 275. 1936. TYPE: TEXAS: CORYELL CO.: near and on the highway, 4 mi S of Copperas Cove, 26 Aug 1934, *George L. Fisher s.n.* (HOLOTYPE: F #761244!).

Differt a *L. eleganti* var. *eleganti* apicibus phyllariis petaloideis flavis aut eburneis vel pallide roseis aut lavandulis; differt a *L. eleganti* var. *kralii* apicibus phyllariis valde recurvatis ac capitulis coacervatis patentibus plerumque sessilibus.

Corms globose; stems sparsely to densely tomentose; lateral heads usually densely crowded, divergent-ascending to spreading at right angles, sessile; phyllaries parallel and appressed below the petaloid portion, the colored apices recurved, abaxially pubescent to tomentose, initially pale lemon yellow, then fading to cream or very pale lavender, rarely rosescent at fruiting; corollas cream-white, tubular, the tube scarcely broadened to the top of the limb, the lobes scarcely flared apically; stigmas cream to light yellow or nearly white.

PARATYPES: **U.S.A. TEXAS. Anderson Co.:** George Engling Wildife Management Area, Upper North Pasture, W Side, 1954 Burn, 18 Sep 1958, *Marsh 55-8* (TEX). **Bastrop Co.:** 1.8 mi SE of McDade along old highway by railroad track, 30 Jul 1992, *Mayfield & Westlund 1486* (NCU, NY, TEX). **Freestone Co.:** FM 1848, 5.8 mi N of Buffalo at jct. US 79, lower Queen City formation, N 31°32'46" W 96°03'22", 6 Sep 1992, *Mayfield 1557* (F, FLAS, GA, GH, NCU, NY, TEX, US); 14 mi S of Fairfield, 15 Aug 1955, *Turner 3904* (BRIT,TEX). **Grimes Co.:** along main highway E of Brazos county line, 4 Sep 1993, *Mayfield et al. 1779* (TEX). **Hardin Co.:** 2.5 mi W of Silsbee, 2 Oct 1945, *Cory 49880* (BRIT). **Henderson Co.:** 8 mi NW of Poynor, grassy open oak woods in sandy soil, flowers whitish, 20 Oct 1963, *Correll 28558* (LL).

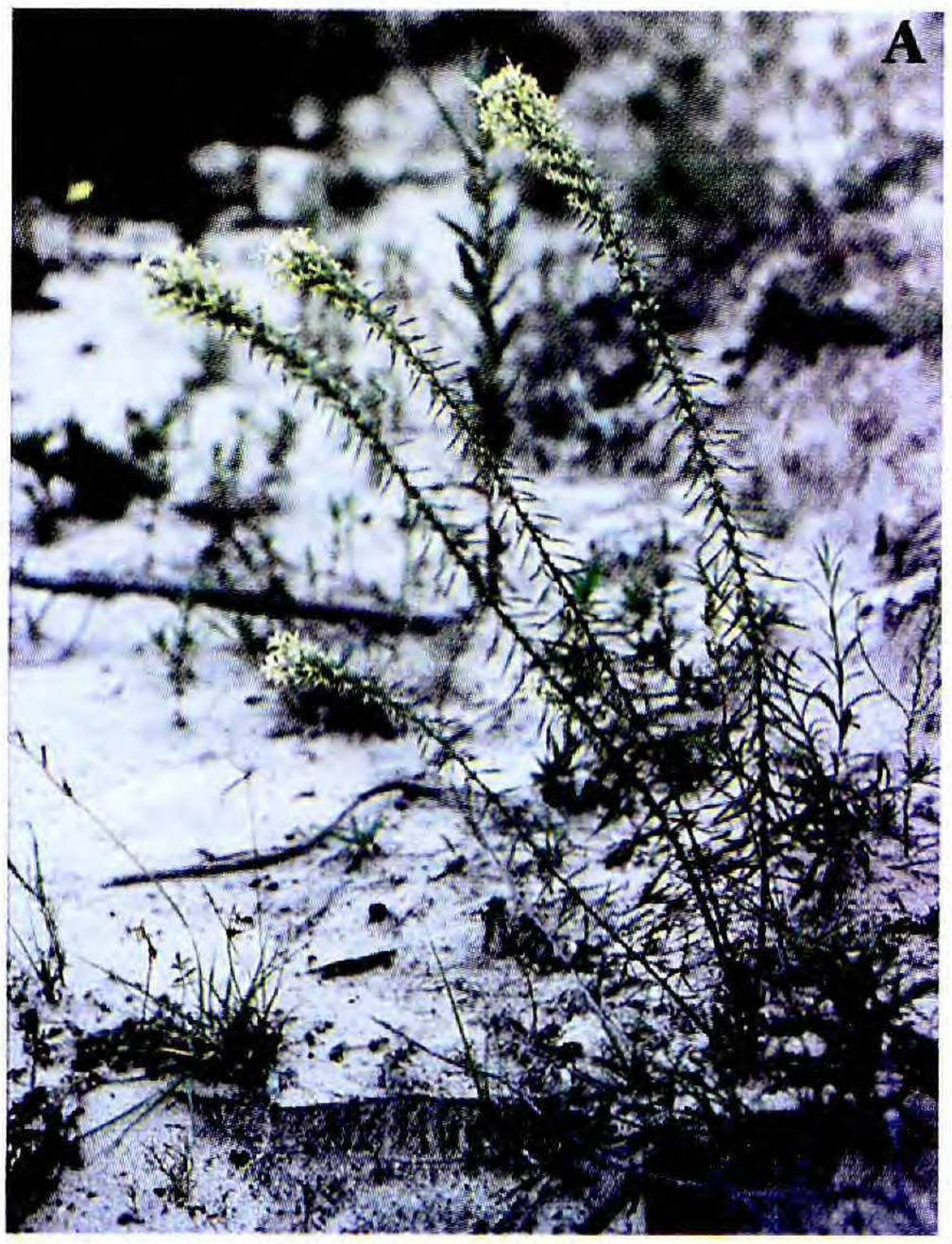

FIG. 1. *Liatris elegans* var. *bridgesii*. **A.** Habit. **B.** Close-up of heads showing yellow to cream phyllary apices.

FIG. 3. *Liatris elegans* var. *carrizana* with consistently colored blue, magenta, lavender, or pink, rather than cream phyllaries.

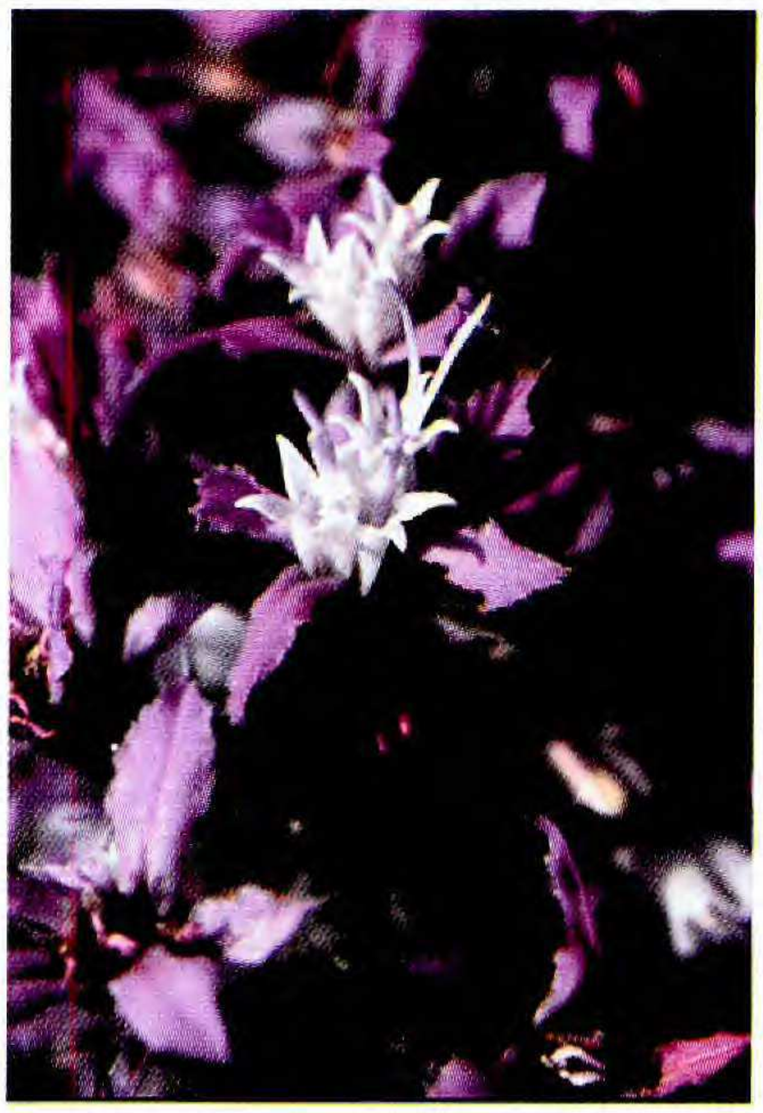

FIG. 2. *Liatris elegans* var. *elegans* with phyllaries that are predominantly shades of lavender, pink, bluish, or magenta.

FIG. 4. *Liatris elegans* var. *kralii*.

Houston Co.: Davy Crockett N. Forest, N of SR 7 from a point 2.6 mi W of the junction of FM 357 and 0.9 mi E of FM 1733, 21 Sep 1991, *Mayfield et al. 1123* (NCU, NY, TEX); 2 mi S of Grapeland, 12 Oct 1937, *Cory 26136* (F). **Lee Co.:** NW of Lexington, on county road to Phears Cemetary, by small pond, Carrizo formation, 500 ft, N 30°27'30" W 97°03'15", 15 Sep 1991, *Mayfield et al. 1117* (GH, NCU, NY, TEX). **Leon Co.:** 5 mi NE of Buffalo along hwy 79, 11 Sep 1958, *Turner 4433* (TEX). **Limestone Co.:** 5.5 mi E of Kosse, 9 Oct 1964, *Shinners 30579* (BRIT). **Nacogdoches Co.:** 4 mi W by N of Garrison, 7 Sep 1948, *Cory 54734* (LL). **Robertson Co.:** county road 330 ca 2.0 mi E of its junction with FM 2246, 500 ft, N 31°01'34" W 96°21'59", 6 Sep 1992, *Mayfield 1559* (GH, NCU, NY, TEX). **San Augustine Co.:** sandy open forest ca. 1.5 mi N of San Augustine, flowers whitish, 14 Oct 1962, *Correll 26282* (LL). **Shelby Co.:** ca. 0.8 mi SE of SR 7 on a parallel unpaved road, ca 0.1 mi W of a small lake on Upper Iron Ore Cr, 1.2 mi E of Mt Hermon, 21 Sep 1991, *Mayfield et al. 1130* (NCU, NY, TEX). **Van Zandt Co.:** Ca. 1.5 mi NW of Ben Wheeler on SR 64, 0.2 mi S of SR 64 opposite a cemetary on the N side of the road, 22 Sep 1991, *Mayfield et al. 1138* (F, GH, NCU, NY, TEX). **Walker Co.:** ca. 3 blocks E of Sam Houston St Un, 27 Sep 1980, *Kessler 3679* (FLAS). **Williamson Co.:** 0.7 road mi N of FM 112 on county road, ca 0.8 mi W of Milam Co. line and 9 mi S of Thorndale, Simsboro Formation, 530 ft, 30°29'24" N, W 97°10'40", 15 Sep 1991, *Mayfield et al. 1120* (F, GH, NCU, NY, TEX). **Wood Co.:** Lake Ellis, 5 mi NE of Crow, 2 Sep 1942, *Lundell 11730* (LL).

Forma as a category fails to represent the clear geographic pattern that occurs in var. *bridgesii*. I have chosen to provide a novel epithet for the present taxon because the type locality of forma *fisheri* is apparently inaccurate. No populations of *L. elegans* var. elegans (Fig. 2) occur anywhere close to the designated location "on the highway 4 miles south of Copperas Cove" in Coryell County. While there are some thin, Cretaceous sand-bearing strata in this area as well as some river terrace sands, searches around Copperas Cove have not yielded populations or habitat suitable for *L. elegans*. Furthermore, no other collections from the area were located in searches of three major herbaria in central Texas, among others. The establishment of a new type and name will serve to solidify the concept of the taxon.

Etymology.—This variety is named for Edwin L. Bridges, prolific plant collector and knowledgeable floristician/taxonomist. Bridges' tenacity in the field and his incredible plant recognition skills are truly inspiring. Our memorable field trips into the sand-bearing strata east of Austin, Texas, were crucial to my understanding of this and many other sand-loving species.

Distribution, variation and ecology.—Liatris elegans var. *bridgesii* is best represented in the southwesternmost part of its range from north of the Colorado River in Bastrop and Lee Counties northeast to Henderson County in Texas. Here, populations consist entirely of individuals with phyllaries that are creamy white to very pale lavender, and possess long-tubed corollas with relatively short weakly flared lobes. In the Post Oak savannas of Williamson, Milam, Lee, and Robertson counties, all populations I found had consistently cream-colored phyllaries. The latter begin the flowering season with a very striking, nearly lemon yellow color in the phyllaries, a color that is otherwise not present in the phyllaries of any Liatrinae. Later in the season, well into fruiting, the color fades to creamy white, sometimes infused with a rose or lavender tinting. Further

northeast, populations seem to intergrade in terms of phyllary color but other features are consistently more like var. *bridgesii* than var. *elegans*. The phyllaries of var. *bridgesii* tend to be longer and more strongly recurved with longer, more narrowly tubular, pale cream corollas than in var. *elegans*. The var. *bridgesii* is similar to the next newly described variety in the pale coloration of the phyllaries, but it has a more compact inflorescence with more strongly recurving phyllary tips and sessile heads (see further discussion below regarding pedunculate heads).

The var. *bridgesii* occurs almost exclusively on Eocene sand-bearing strata running from southwest to northwest from the north side of the Colorado River in Bastrop County to Wood County in the northeast. Its influence is also apparent in population eastward through Cherokee and Houston, to Nacogdoches, Shelby, and San Augustine Counties where the Carrizo formation is exposed around the western margin of the Sabine uplift. Post-oak savanna is the primary habitat where this variety is found. Mixed pine forests of eastern Texas are more likely to have populations of *L. elegans* var. *elegans* (Fig. 2) but both occur therein and some intergradation is observed.

Liatris elegans var. **carrizana** L.O. Gaiser (**Fig. 3**) occurs south of the Colorado River in Texas on deep, sandy soils of xeric sandhills (cf. Gaiser 1946). This variety is characterized by its elongated, napiform corm suited to the drier climate and deep sands that prevail in this region. Its phyllaries are structurally similar to those of the var. *bridgesii*, with elongated strongly recurving apices, but they are consistently colored blue, magenta, lavender, or pink, rather than cream. Populations of var. *carrizana* just to the south of the Colorado River in Bastrop and Caldwell Counties, Texas, may have more or less globular corms but are otherwise more similar to the var. *carizzana*. In all other areas, *L. elegans* has depressed globose corms as is true of many species of the genus.

Liatris elegans Michx. var. **kralii** Mayfield, var. nov. (**Fig. 4**).TYPE: U.S.A. ALABAMA. LEE CO.: Locally abundant in open pine woods 6 mi S of Auburn, 23 Sep 1899, *F.S. Earle and E.S. Earle 94* (HOLOTYPE: KSC!; ISOTYPES: F! GH! ND NY! US).

Similis a *L. eleganti* var. *bridgesii* apicibus phyllariis flavis aut albis vel pallide lavandulis sed capitulis ascendentibus pedunculatis magis interruptis et phyllariis divergentibus (vs. appressis) infra partem petaloideum ac leniter recurvatis ad apices.

Corms globose; stems sparsely to densely lanose-tomentose; lateral heads (at anthesis) usually loosely arranged, ascending to divergent, pedunculate; phyllaries abaxially tomentose to densely lanose, divergent along their length, the petaloid apices flaring only slightly or not at all, initially light yellow or cream, then fading to cream; less often pale lavender to rose, corollas pure-white, tubular, the tube flaring gradually to the top of the limb, the lobes strongly flared; stigmas white to very pale lavender.

PARATYPES: **U.S.A. ALABAMA. Baldwin Co.:** Gateswood, 30 Oct 1903, *Tracy 8568* (F,GH). **Barbour Co.:**

6.4 mi N of the Barbour/Dale County line along Alabama route 51, ca. 4.5 mi N of Doster, Turkey Oak/Bluejack Oak/Hickory sandhill area, 495 ft, 31°40'55" N, 85°38'10" W, 12 Aug 1994, *Mayfield & Fuertes 2011* (TEX). **Covington Co.:** Dozier, 31 Oct 1941, *Reed 2053* (TEX). **Escambia Co.:** dry, sandy area above low hillside seepage bog under powerline, on N side of western extension of Co Rd 6, 2.4 mi W of Co Rd 27 and 2.6 mi W of AL 113 at a point 3.8 mi N of int US 31 E of Flomaton, just W of Pond Cr, SH SWQ SEQ of sec 1, T1N R7E, Flomaton 7.5' quad, Soils-Plummer (Grossarenic paleaquults), elev 130 ft, 31°04'14" N, 87°19'01" W, 11 Sep 1989, *Orzell and Bridges 11815* (TEX); 3 mi s of Canoe, 17 Oct 1929, *O'Neill 6171* (FLAS). **Geneva Co.:** Sandy west banks of Choctawhatchee River between Geneva and Eunola by Al 52, 18 Sep 1971, *Kral 44342* (NY). **Lee Co.:** 2.1 mi NW of Phenix City, 17 Sep 1971, *Kral 44247* (NY). **Mobile Co.:** USA Property, 17 Oct 1968, *Lelong 4879* (NCU). **Russell Co.:** 1 mi SE of Glenville, 26 Sep 1976, *Haynes 6021* (NCU). **FLORIDA. Okaloosa Co.:** Crestview, 29 Sep 1946, *Knight s.n.* (NCU). **Santa Rosa Co.:** pine woods on Juniper Creek, Rd. 4, 6 Oct 1949, *Hood 3226* (FLAS). **Washington Co.:** vicinity of Falling Waters Sink, longleaf pine deciduous scrub oak forest, 17 Sep 1956, *Kral 3574* (GH). **GEORGIA. Ben Hill Co.:** 7 mi NNW of Fitzgerald, 26 Oct 1968, *Faircloth 5691* (NCU). **Coffee Co.:** 7.2 mi E of ridge on outcrop of Altamaha Grit, 17 Oct 1970, *Faircloth 6936* (NCU). **Grady Co.:** Sandy clay ridge, open, 2 mi W of Wigham, 26 Oct 1963, *Godfrey 63218* (LL). **Macon Co.:** Near Marshallville, 28 Sep 1926, *Dunegan 15* (LL). **Meriwether Co.:** Warm Springs, 1 Oct 1945, *Totten et al. s.n.* (NCU). **Muscogee Co.:** Columbus, 17 Sep 1902, *Biltmore Herbarium* [no further collector information on label] (NY). **Taylor Co.:** Sandy scrub oak habitat of deep sands of Fall Line Sand Hills, ca. 1 mi NNE of Charing and 11-12 mi SW of Butler on GA 137, 10 Sep 1974, *Jones* et al. *22598* (NCU); 3.8–4.0 mi N of Butler on high wand ridge along HWY 19, xeric longleaf pine/turkey oak sandhill woodland, Fall-Line Sandhills, 570 ft, 32°36'34" N, 84°14'15" W, 11 Aug 1994, *Mayfield & Fuertes 1998* (TEX).

Etymology.—This variety is named to honor Dr. Robert R. Kral, well known as one of the most knowledgeable botanists on the southeastern US flora. Kral's personal collections amassed over four decades from the coastal plain have contributed greatly to the understanding of this and many other species. His classes I took as an undergraduate in Plant Taxonomy and Dendrology stimulated my interest in botany.

Distribution, variation, and ecology.—*Liatris elegans* var. *kralii* occurs in two major population centers. Populations to the north, in the Fall-Line Sandhills of western-central Georgia to eastern-central Alabama, including the type, consistently bear phyllary apices that are white to light tan in color. A second, somewhat separated area of occurrence is further to the south in counties along the southern tier of Georgia, northern tier of Florida, and west to Mobile County in Alabama. In this area scattered populations of var. *kralii* occur sympatrically (but not apparently in mixed populations) with var. *elegans*. The var. *elegans* is much more common in this area but relatively pure populations of var. *kralii* do occur, albeit usually with both white and pale lavender forms (e.g., *Kral 37333*, Mobile Co., AL; *Kral 44342*, Geneva Co., AL; *Faircloth 5691*, Ben Hill Co., GA; *Kral 3574*, Washington Co., FL). All populations referable to var. *kralii* have short peduncles bearing the heads and the heads are well-spaced and ascending. Although pedunculate heads may otherwise occur throughout the range of the species in shaded or apically injured plants, these are rare and unusual. Also, the phyllaries of var. *kralii* are longer and narrower, with the petaloid portion especially elongate in proportion to the basal herba-

ceous portion. Another recognizable trait of var. *kralii* is the divergent phyllaries with the tips ascending, rather than recurved. All other varieties have more strongly recurved phyllary apices, with the lower herbaceous portions closely appressed.

Variety *flabellata*.—The type specimen of var. *flabellata* apparently consists of a single plant divided into two separate sheets. The only two sheets referable to this taxon are at NY; one has a single plant with root and two stems attached and a third stem severed at the base. The second sheet is a single stem that appears to have come from the severed base of the plant on the other sheet. The only feature separating this plant from var. *elegans* is its emarginate to truncate, relatively broadened (flabellate) phyllary apices. From the same locality (St. Helena Island, S.C.) numerous other specimens collected by Cuthbert at NY and FLAS have phyllary morphology as is typical for the var. *elegans*. Thus, I view the type specimen as consisting of a single plant from a locality with plants otherwise identical to the var. *elegans*. Thus it is best treated as an aberrant or freak, admittedly distinctive, but not persisting as a viable population. It is reduced here to a form of var. *elegans*.

Liatris elegans Michx. var. **elegans** forma **flabellata** (Small) Mayfield, comb. nov.

Laciniaria flabellata Small, Bull. Torrey Bot. Club 25:472. 1898. *Liatris flabellata* (Small) K. Schum., Just's Bot. Jahresber. 26:378. 1900. *Liatris elegans* (Walter) Michx, var. *flabellata* (Small) Gaiser, Rhodora 48:345. 1946. TYPE: SOUTH CAROLINA. BEAUFORT CO.: St. Helena Island, dry barrens, Sept 1894, *A. Cuthbert s.n.* (HOLOTYPE: NY!; ISOTYPE: NY!).

ACKNOWLEDGMENTS

The curators of herbaria cited are acknowledged for loaning specimens and the many field trips were in part supported by my graduate institution-Plant Resources Center, Dept. of Botany, at the University of Texas at Austin. Thanks are also due to my several field companions who so graciously gave their time to allow me to collect *Liatris elegans*. Guy Nesom greatly improved an earlier draft of the manuscript and provided the Latin translations for the diagnoses.

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